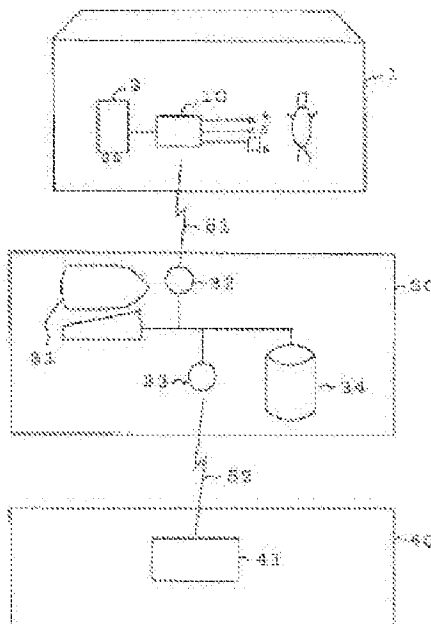


HOME HEALTH CARE AID SYSTEM

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Abstract of JP 7095963 (A)

PURPOSE: To achieve a streamlining of home care by a method wherein various necessary physiological information is detected with devices equipped at the residences of patients, the physiological information is sent to an information center with telephone lines to be stored and converted to charts and character information suitable for diagnosis to be transmitted to hospitals in charge with a facsimile. **CONSTITUTION:** At the residence of a patient 1, for example, a case under the care with an oxygen concentrator 3, physiological information which is detected with a frequency of breathing sensor 4, a blood oxygen saturation sensor 5 and a handy electrocardiograph 6 mounted on the patient is transmitted punctually and temporarily to an information collection center 30 with a communication apparatus 10 and a telephone line 51.; At the center 30, the physiological information is converted to charts and character information suitable for diagnosis with a computer 31 through a modem 32 to be stored 34. Also at the center 30, the physiological information is sorted on emergency, periodical and monthly basis and transmitted to a facsimile 41 of a hospital 40 in charge with a facsimile 33 and the telephone line 52. The physiological information is judged by a physician in charge for doctor's questions or necessary treatment. This achieves a streamlining of home care thereby making patients at ease.



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CLAIMS

[Claim(s)]

[Claim 1]A home therapy supporting system which is a thing containing digital data of the saturation of oxygen in blood which is a home therapy supporting system, and in which coincidence measurement was carried out by measuring means which this physiology information possesses, and/or a pulse rate characterized by comprising the following, and a data point of a pulse wave signal.

** A home communication apparatus possessing a transmitting means for being arranged in each patient's home and transmitting a signal of medical information about an in-home patient's physiology information to an information gathering center.

** A reception means for receiving a signal about medical information which has been arranged in this information gathering center and has been transmitted from this home communication apparatus.

A signal conversion means for changing a received signal into a chart and text suitable for diagnosis.

A medical information collecting apparatus possessing a facsimile means for transmitting a chart and text which were changed by this signal conversion means to a hospital, ** A dial-up line which ties a chart and a receiving set of text suitable for diagnosis possessing a facsimile means for receiving a chart and text which have been arranged in a hospital and have been transmitted from this medical information collecting apparatus, and home ** this communication apparatus, this medical information collecting apparatus, this chart and a receiving set of text.

[Claim 2]A home therapy supporting system of claim 1 which is what digital data of this pulse rate becomes from average value and standard deviation in a latter half part of measurement.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention is a home therapy supporting system about the medical

information and the medical-apparatus machine of various diseases which need to continue at a long period of time and need to treat at home like the patient who enforces a domiciliary oxygen therapy.

[0002]

[Description of the Prior Art]The patient of the breathing problem which needs a long-term therapy, or chronic diseases, such as hypertension and diabetes mellitus, has managed health condition by going to hospital regularly periodically according to the condition which moves aside then, continuing a therapy based on a medical practitioner's formula. In this case, in order for a medical practitioner to grasp a patient's health condition and compliance correctly and to perform suitable instruction, there is a remarkable problem.

[0003]For example, in the case of the patient of a domiciliary oxygen therapy, physical strength is exhausted by going to hospital regularly, and the saturation of oxygen in blood lower than usually at the time of periodic diagnosis is presented. If the patient who resides in a mountain slope or a detached island has, the physical burden of going to hospital regularly itself is a problem. Grasp of compliance is [whether the patient is attracting the high-concentration oxygen generated from an oxygen enricher as a formula, and] also a medical practitioner's diagnostic overlay important point.

[0004]The system which manages a patient's health condition and the operating condition of medical equipment is proposed [various] to such a problem using online communications.

[0005]As an example indicated by the gazette, there are JP,4-15035,A (recuperation-at-home supporting system), JP,2-246463,A (examination report transmission systems), JP,63-252137,A (electronic device for medicine diagnosis), JP,63-79643,A (human body healthy monitor), etc.

[0006]

[Problem(s) to be Solved by the Invention]However, in the system of these former, when putting in practical use, apparatus cost becomes very high or there are problems, like the employment after system introduction is difficult.

[0007]That is, although the biological information about an in-home patient's physiology has a common system configuration directly transmitted to the computer of the information gathering center installed in the hospital from the device installed in patient's home, the hospital side must hold a computer separately in this case. However, since the patient number which most hospitals are holding is 10-100 or less persons, introducing a computer for exclusive use hesitates it in many cases.

[0008]In the case of the system which installs a commercial facsimile in the hospital side, it is necessary for the device installed in patient's home to give an image transformation function and a facsimile-transmission function, and does not become advantageous in cost. In order to perform temporal diagnosis, when you need the memory which records a patient's biological information for a long period of time, it cannot but install a computer in the hospital side too.

[0009]On the other hand, if needed besides daily condition, the patient who continues a therapy at home measures using a thermometer, the oximeter in a simple electrocardiograph and blood, etc., and writes down a result on a medical-treatment diary. Although I have you diagnose by

showing this to a medical practitioner at the time of going to hospital regularly, there is a problem of actually following many. That is, they are that a patient continues writing a medical-treatment diary correctly every day, operating the aforementioned measuring instrument correctly, correspondence at the time of storage of the result, the frequency of going to hospital regularly, and sudden change of condition, etc.

[0010]Although system proposals, such as JP,4-56561,A and JP,4-15035,A, are indicated to this problem, all need to install a computer to the information center by the side of a hospital, and the whole system cost becomes high.

[0011]In view of the above-mentioned conventional technical problem, this invention persons are Japanese Patent Application No. 5-21085, and aimed at reduction of a patient's number of times of going to hospital regularly, the reduction of incidence of medical-treatment diary entry and condition measurement, and urgent correspondence at the time of condition sudden change in the home treatment of various diseases, and they proposed the home therapy supporting system of low cost conventionally.

[0012]If it is in this home therapy supporting system, the patient itself will operate the oxygenation densimeter in blood (for example, pulse oximeter which inserts an index finger into a detection probe and measures saturated concentration using an absorption-of-light phenomenon (brand name)). proper instruction makes from the medical practitioner side to a patient about this operation -- having -- although are carried out, and it is an amateur therefore, data mistaken by a failure which is described below may get across to the medical practitioner side. Moving the finger whose ** insertion insertion of ** finger is shallow and is doing as an example of a failure etc. will be mentioned, and the oxygenation concentration in blood will be measured by slight lowness severalpercent. When the data of such an error has been sent to the medical practitioner side, the medical practitioner side has the danger of drawing the mistaken diagnosis.

[0013]

[Objects of the Invention]This invention is made in view of this problem, and the purpose is to provide the home therapy supporting system which can prevent a misdiagnosis.

[0014]

[Means for Solving the Problem]A medical information collecting apparatus this invention is characterized by that comprises the following, ** A chart and a receiving set of text suitable for diagnosis possessing a facsimile means for receiving a chart and text which have been arranged in a hospital and have been transmitted from this medical information collecting apparatus, ** It is a home therapy supporting system which consists of a dial-up line which ties this home communication apparatus, this medical information collecting apparatus, this chart, and a receiving set of text, What provides a home therapy supporting system with which this physiology information contains digital data of the saturation of oxygen in blood in which coincidence measurement was carried out by measuring means to provide, and/or a pulse rate, and a data point of a pulse wave signal.

** A home communication apparatus possessing a transmitting means for being arranged in each patient's home and transmitting a signal of medical information about an in-home patient's

physiology information to an information gathering center.

** A reception means for receiving a signal about medical information which has been arranged in this information gathering center and has been transmitted from this home communication apparatus.

A signal conversion means for changing a received signal into a chart and text suitable for diagnosis.

A facsimile means for transmitting a chart and text which were changed by this signal conversion means to a hospital.

[0015]When a medical practitioner looks at synthetically three data obtained from oximeter in one blood with this home therapy supporting system, existence of a failure of an incorrect degree-of-saturation meter can be guessed.

[0016]

[Function]In this invention, the medical data from patient's home is sent to the basis of the medical practitioner of charge by a facsimile via an information gathering center. Since the computer of a center performs advanced processings, such as a statistical procedure of data, image transformation, database management, the communication apparatus installed in patient's home can simplify the function. A low price thing comparable as the personal computer communications which spread in recent years [of the modem which sends data by a telephone line] can be used. Since it was not necessary to install a special receiving set in a hospital on the other hand and a commercial facsimile was used, it not only makes cost of the whole system into a low price conventionally, but it became possible to carry out the home therapy supporting system by this invention in the hospital which treats several in-home patients. The digital data of the saturation of oxygen in blood and a pulse rate will become existence on diagnosis as a trend together with the past data. Under the present circumstances, when new data became low compared with the past data, it could judge by observing the data point of a pulse wave well by the what [is depended on an operational mistake], thing [to depend on a patient's condition change], or medical practitioner side.

[0017]

[Example]The example of this invention is shown in drawing 1 and drawing 2. Drawing 1 shows the whole composition.

Drawing 2 shows the details of the communication apparatus (10) installed in being home.

[0018]In drawing 1, (1) is a home in which a patient resides, and a patient enforces a domiciliary oxygen therapy, attracting high-concentration oxygen from an oxygen enricher (3).

[0019]Although mentioned later for details, medical information, such as a patient's besides the operation information of an oxygen enricher oral consultation information, a breathing rate, the saturation of oxygen in blood, a pulse, and an electrocardio waveform, is incorporated into the communication apparatus (10) installed in patient's home. These information is transmitted to the computer (31) installed in the information gathering center (30) which is a medical information

collecting apparatus via a dial-up line (51) by a modem (12). The modem (32) is connected to this computer (30), and, thereby, medical information communication with each home can be performed. The medical information transmitted from each home is recorded and managed by mass memory storage (34). Among drawing 1, (4) expresses the sensor means which detects a patient's breathing rate, (5) is a detection probe means for measuring a patient's saturation of oxygen in blood, etc., and (6) expresses a simple electrocardiograph.

[0020]Here, according to the purpose use, as for each patient's memorized medical information, an outline, for example, the following three kinds of reports, is created. That is, they are ** immediate report document, ** periodical report, and ** moon degree report. or [that the gestalt of the information sent from a home is a character string] -- or, Since it is the numerical sequence which quantized the electrocardio waveform etc., these information, It is transmitted to the facsimile (41) installed in the hospital (40) where a patient goes to hospital regularly via a dial-up line (52) from the facsimile (33) which image transformation was carried out to the aforementioned report form, and was connected to the computer, and is sent to a doctor's in attendance hand.

[0021]Next, drawing 2 explains a communication apparatus (10). The modem (12) with which a communication apparatus performs data communications via CPU (11), the computer of an information center, and a dial-up line, The communication interface (13) which receives the equipment operation information from an oxygen enricher (3), The interface (14) which connects the sensor (4) which detects a patient's breathing rate, The test section (15) which connects the detection probe (5) with which a patient's finger is equipped, and measures the saturation of oxygen in blood, and a pulse rate, The interface (16) which receives the electrocardio data point measured with the simple electrocardiograph (6) by optical transmission, It comprises a push button (21) for the calendar function part (19) for performing the liquid crystal graphical display machine (17) and the touch panel (18), and time of day control for performing a dialog with a patient, sound production parts (20), such as a buzzer, and a medical data measurement start.

[0022]If a communication apparatus becomes constant time by a calendar function, from a sound production part, it will tell to a patient that the time of measurement came, and it will press so that condition measurement using the oral consultation entry of data and measuring instrument about condition may be carried out. A patient inputs an oral consultation result, operating a touch panel out of the question about appetite, body temperature, etc. which were displayed on the liquid crystal display, and the prepared answer item. Then, according to directions of a liquid crystal display screen, measurement of a breathing rate, the saturation of oxygen in blood and a pulse rate, and an electrocardiogram is carried out continuously. One medical data measurement is completed in inputting whether finally, it is urgent at a medical practitioner's hand, and a measurement result is sent to it.

[0023]On the other hand, the operation information from an oxygen enricher is always incorporated into the communication apparatus, and the hour-of-use information for every set flow rate effective in checking a patient's compliance may be made to be generated. When a patient is inconvenient at constant time, the same medical data measurement as the above can be

temporarily carried out with a push button (21). In order that carrying out measurement of the electrocardiogram using a measuring instrument, etc. and all the items, such as oral consultation, several times to a day may enlarge a patient's burden dramatically, it is considered on the program in a measurement procedure which carries out a required item by required frequency at convenience [of a patient].

[0024]Measurement of the saturation of oxygen in blood, a pulse rate, and a breathing rate is explained here. The saturation-of-oxygen (SaO_2 is called below) data in blood and pulse rate data are sent to CPU (11) the sample cycle of 1.0 second as digital data like 97% and 70 times from a test section (15), respectively. Simultaneously, as shown in drawing 3 (a) from a test section (15), pattern-of-pulse-wave data is outputted, and this data point is sent to CPU (11) the sample cycle of 0.01 second. It is preferred to receive the data between measuring time (45 seconds), to use the data for 20 seconds in the second half of measurement as valid data in CPU (11), and to treat as follows.

[0025] SaO_2 and pulse rate data ask for an average and standard deviation from valid data, and make this a measurement result. **** peak value makes the valid data for 20 seconds a data point in the second half.

[0026]As for breathing-rate data, it is desirable to measure simultaneously with measurement of SaO_2 and a pulse rate. Measurement of a breathing rate is started in 25 seconds from a SaO_2 measurement start for stability of a breathing-rate detection sensor (4). Measurement is performed for 20 seconds and the respiration signals detected from the breathing-rate detection sensor (4) are sent to CPU. In CPU (11), from respiration signals, a breathing rate is counted, and it converts into the breathing rate per minute after measuring finish, and let this be a measurement result.

[0027]The pattern of pulse wave measured simultaneously with SaO_2 and pulse rate data as prevention from a misdiagnosis of the medical practitioner by a patient's failure by the measurement using the oximeter in blood will be sent to the medical practitioner side. As shown in drawing 3, when there is a problem in measurement -- measurement moves violently a finger with shallow (drawing 3 .b) insertion of a finger compared with a right case (drawing 3 .a) (drawing 3 .c) -- SaO_2 is low about 10%. If a pattern of pulse wave (figure a.b.c) is seen at this time, the medical practitioner side can judge ***** as a result of obtaining SaO_2 data by right measurement, and can perform prevention from a misdiagnosis.

[0028]A pattern of pulse wave as shown in the SaO_2 data processed by CPU (11), pulse rate data, and drawing 3 (a), and breathing-rate data are displayed on a liquid crystal graphical display machine (17).

[0029]Thus, the practically outstanding advantage to which judgment of being fitness physiology information becomes easy, and the prevention from a misdiagnosis is attained in the case of diagnosis by the hospital side is acquired by being characterized by this invention transmitting the pattern-of-pulse-wave data by which parenchyma top coincidence measurement was carried out with the saturation of oxygen in blood, etc.

[0030]Next, the report to a medical practitioner is explained.

[0031]** An immediate report document corresponds, when a patient wants to send a measurement result to a medical practitioner's hand immediately. Shortly after the computer of an information gathering center receives this measurement result, after recording on memory storage, via a facsimile, it changes this measurement result into an immediate report document, and transmits to a medical practitioner. At this time, the medical practitioner can carry out more suitable diagnosis and treatment by part[on several]-giving the last measurement result, and drawing up a report.

[0032]** A periodical report collects the measurement result from a patient by fixed time, summarizes it in a report, and transmits to a medical practitioner's office hours belt (usually during the morning of the next morning) to a medical practitioner. Although separately decided on a period according to a patient's condition, it is a day cycle and the stable patient is usually good also as three to 7 diurnal periodicity.

[0033]** A moon degree report is a report which contained the trend graph of blood oxygen levels, etc. by the contents which collected the measurement result from a patient by one month so that could grasp the change with time for one month.

[0034]

[Effect of the Invention]As explained above, according to this invention, the patient can carry out at a house condition measurement using the oral consultation and measuring instrument which were made conventionally only in the hospital. This can lessen physical strength consumption by going to hospital regularly, and, moreover, a medical practitioner can know the measurement data in a usual state. When blood oxygen levels fall, a patient's measuring situation can be grasped with reference to a pattern of pulse wave, and the check of the reliability of measurement data can also be performed. Thus, since a patient feels easy more and can enforce a home therapy, aging progresses and the patient who enforces a home therapy can say this system as a colander system from required ***** today when it will increase increasingly from now on.

TECHNICAL FIELD

[Industrial Application]This invention is a home therapy supporting system about the medical information and the medical-apparatus machine of various diseases which need to continue at a long period of time and need to treat at home like the patient who enforces a domiciliary oxygen therapy.

PRIOR ART

[Description of the Prior Art]The patient of the breathing problem which needs a long-term therapy, or chronic diseases, such as hypertension and diabetes mellitus, has managed health condition by going to hospital regularly periodically according to the condition which moves

aside then, continuing a therapy based on a medical practitioner's formula. In this case, in order for a medical practitioner to grasp a patient's health condition and compliance correctly and to perform suitable instruction, there is a remarkable problem.

[0003]For example, in the case of the patient of a domiciliary oxygen therapy, physical strength is exhausted by going to hospital regularly, and the saturation of oxygen in blood lower than usually at the time of periodic diagnosis is presented. If the patient who resides in a mountain slope or a detached island has, the physical burden of going to hospital regularly itself is a problem. Grasp of compliance is [whether the patient is attracting the high-concentration oxygen generated from an oxygen enricher as a formula, and] also a medical practitioner's diagnostic overlay important point.

[0004]The system which manages a patient's health condition and the operating condition of medical equipment is proposed [various] to such a problem using online communications.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the system of these former, when putting in practical use, apparatus cost becomes very high or there are problems, like the employment after system introduction is difficult.

[0007]That is, although the biological information about an in-home patient's physiology has a common system configuration directly transmitted to the computer of the information gathering center installed in the hospital from the device installed in patient's home, the hospital side must hold a computer separately in this case. However, since the patient number which most hospitals are holding is 10-100 or less persons, introducing a computer for exclusive use hesitates it in many cases.

[0008]In the case of the system which installs a commercial facsimile in the hospital side, it is necessary for the device installed in patient's home to give an image transformation function and a facsimile-transmission function, and does not become advantageous in cost. In order to perform temporal diagnosis, when you need the memory which records a patient's biological information for a long period of time, it cannot but install a computer in the hospital side too.

[0009]On the other hand, if needed besides daily condition, the patient who continues a therapy at home measures using a thermometer, the oximeter in a simple electrocardiograph and blood, etc., and writes down a result on a medical-treatment diary. Although I have you diagnose by showing this to a medical practitioner at the time of going to hospital regularly, there is a problem of actually following many. That is, they are that a patient continues writing a medical-treatment diary correctly every day, operating the aforementioned measuring instrument correctly, correspondence at the time of storage of the result, the frequency of going to hospital regularly, and sudden change of condition, etc.

[0010]Although system proposals, such as JP,4-56561,A and JP,4-15035,A, are indicated to this problem, all need to install a computer to the information center by the side of a hospital, and the whole system cost becomes high.

[0011]In view of the above-mentioned conventional technical problem, this invention persons are Japanese Patent Application No. 5-21085, and aimed at reduction of a patient's number of times of going to hospital regularly, the reduction of incidence of medical-treatment diary entry and condition measurement, and urgent correspondence at the time of condition sudden change in the home treatment of various diseases, and they proposed the home therapy supporting system of low cost conventionally.

[0012]If it is in this home therapy supporting system, the patient itself will operate the oxygenation densimeter in blood (for example, pulse oximeter which inserts an index finger into a detection probe and measures saturated concentration using an absorption-of-light phenomenon (brand name)). proper instruction makes from the medical practitioner side to a patient about this operation -- having -- although are carried out, and it is an amateur therefore, data mistaken by a failure which is described below may get across to the medical practitioner side. Moving the finger whose ** insertion insertion of ** finger is shallow and is doing as an example of a failure etc. will be mentioned, and the oxygenation concentration in blood will be measured by slight lowness severalpercent. When the data of such an error has been sent to the medical practitioner side, the medical practitioner side has the danger of drawing the mistaken diagnosis.

[0013]

[Objects of the Invention]This invention is made in view of this problem, and the purpose is to provide the home therapy supporting system which can prevent a misdiagnosis.

MEANS

[Means for Solving the Problem]A medical information collecting apparatus this invention is characterized by that comprises the following, ** A chart and a receiving set of text suitable for

diagnosis possessing a facsimile means for receiving a chart and text which have been arranged in a hospital and have been transmitted from this medical information collecting apparatus, ** It is a home therapy supporting system which consists of a dial-up line which ties this home communication apparatus, this medical information collecting apparatus, this chart, and a receiving set of text, What provides a home therapy supporting system with which this physiology information contains digital data of the saturation of oxygen in blood in which coincidence measurement was carried out by measuring means to provide, and/or a pulse rate, and a data point of a pulse wave signal.

** A home communication apparatus possessing a transmitting means for being arranged in each patient's home and transmitting a signal of medical information about an in-home patient's physiology information to an information gathering center.

** A reception means for receiving a signal about medical information which has been arranged in this information gathering center and has been transmitted from this home communication apparatus.

A signal conversion means for changing a received signal into a chart and text suitable for diagnosis.

A facsimile means for transmitting a chart and text which were changed by this signal conversion means to a hospital.

[0015]When a medical practitioner looks at synthetically three data obtained from oximeter in one blood with this home therapy supporting system, existence of a failure of an incorrect degree-of-saturation meter can be guessed.

OPERATION

[Function]In this invention, the medical data from patient's home is sent to the basis of the medical practitioner of charge by a facsimile via an information gathering center. Since the computer of a center performs advanced processings, such as a statistical procedure of data, image transformation, database management, the communication apparatus installed in patient's home can simplify the function. A low price thing comparable as the personal computer communications which spread in recent years [of the modem which sends data by a telephone line] can be used. Since it was not necessary to install a special receiving set in a hospital on the other hand and a commercial facsimile was used, it not only makes cost of the whole system into a low price conventionally, but it became possible to carry out the home therapy supporting system by this invention in the hospital which treats several in-home patients. The digital data of the saturation of oxygen in blood and a pulse rate will become existence on diagnosis as a trend together with the past data. Under the present circumstances, when new data became low compared with the past data, it could judge by observing the data point of a pulse wave well by the what [is depended on an operational mistake], thing [to depend on a patient's condition change], or medical practitioner side.

[0017]

EXAMPLE

[Example]The example of this invention is shown in drawing 1 and drawing 2. Drawing 1 shows the whole composition.

Drawing 2 shows the details of the communication apparatus (10) installed in being home.

[0018]In drawing 1, (1) is a home in which a patient resides, and a patient enforces a domiciliary oxygen therapy, attracting high-concentration oxygen from an oxygen enricher (3).

[0019]Although mentioned later for details, medical information, such as a patient's besides the operation information of an oxygen enricher oral consultation information, a breathing rate, the saturation of oxygen in blood, a pulse, and an electrocardio waveform, is incorporated into the communication apparatus (10) installed in patient's home. These information is transmitted to the computer (31) installed in the information gathering center (30) which is a medical information collecting apparatus via a dial-up line (51) by a modem (12). The modem (32) is connected to this computer (30), and, thereby, medical information communication with each home can be performed. The medical information transmitted from each home is recorded and managed by mass memory storage (34). Among drawing 1, (4) expresses the sensor means which detects a patient's breathing rate, (5) is a detection probe means for measuring a patient's saturation of oxygen in blood, etc., and (6) expresses a simple electrocardiograph.

[0020]Here, according to the purpose use, as for each patient's memorized medical information, an outline, for example, the following three kinds of reports, is created. That is, they are ** immediate report document, ** periodical report, and ** moon degree report. or [that the gestalt of the information sent from a home is a character string] -- or, Since it is the numerical sequence which quantized the electrocardio waveform etc., these information, It is transmitted to the facsimile (41) installed in the hospital (40) where a patient goes to hospital regularly via a dial-up line (52) from the facsimile (33) which image transformation was carried out to the aforementioned report form, and was connected to the computer, and is sent to a doctor's in attendance hand.

[0021]Next, drawing 2 explains a communication apparatus (10). The modem (12) with which a communication apparatus performs data communications via CPU (11), the computer of an information center, and a dial-up line, The communication interface (13) which receives the equipment operation information from an oxygen enricher (3), The interface (14) which connects the sensor (4) which detects a patient's breathing rate, The test section (15) which connects the detection probe (5) with which a patient's finger is equipped, and measures the saturation of oxygen in blood, and a pulse rate, The interface (16) which receives the electrocardio data point measured with the simple electrocardiograph (6) by optical transmission, It comprises a push button (21) for the calendar function part (19) for performing the liquid crystal graphical display

machine (17) and the touch panel (18), and time of day control for performing a dialog with a patient, sound production parts (20), such as a buzzer, and a medical data measurement start. [0022]If a communication apparatus becomes constant time by a calendar function, from a sound production part, it will tell to a patient that the time of measurement came, and it will press so that condition measurement using the oral consultation entry of data and measuring instrument about condition may be carried out. A patient inputs an oral consultation result, operating a touch panel out of the question about appetite, body temperature, etc. which were displayed on the liquid crystal display, and the prepared answer item. Then, according to directions of a liquid crystal display screen, measurement of a breathing rate, the saturation of oxygen in blood and a pulse rate, and an electrocardiogram is carried out continuously. One medical data measurement is completed in inputting whether finally, it is urgent at a medical practitioner's hand, and a measurement result is sent to it.

[0023]On the other hand, the operation information from an oxygen enricher is always incorporated into the communication apparatus, and the hour-of-use information for every set flow rate effective in checking a patient's compliance may be made to be generated. When a patient is inconvenient at constant time, the same medical data measurement as the above can be temporarily carried out with a push button (21). In order that carrying out measurement of the electrocardiogram using a measuring instrument, etc. and all the items, such as oral consultation, several times to a day may enlarge a patient's burden dramatically, it is considered on the program in a measurement procedure which carries out a required item by required frequency at convenience [of a patient].

[0024]Measurement of the saturation of oxygen in blood, a pulse rate, and a breathing rate is explained here. The saturation-of-oxygen (SaO_2 is called below) data in blood and pulse rate data are sent to CPU (11) the sample cycle of 1.0 second as digital data like 97% and 70 times from a test section (15), respectively. Simultaneously, as shown in drawing 3 (a) from a test section (15), pattern-of-pulse-wave data is outputted, and this data point is sent to CPU (11) the sample cycle of 0.01 second. It is preferred to receive the data between measuring time (45 seconds), to use the data for 20 seconds in the second half of measurement as valid data in CPU (11), and to treat as follows.

[0025] SaO_2 and pulse rate data ask for an average and standard deviation from valid data, and make this a measurement result. ***** peak value makes the valid data for 20 seconds a data point in the second half.

[0026]As for breathing-rate data, it is desirable to measure simultaneously with measurement of SaO_2 and a pulse rate. Measurement of a breathing rate is started in 25 seconds from a SaO_2 measurement start for stability of a breathing-rate detection sensor (4). Measurement is performed for 20 seconds and the respiration signals detected from the breathing-rate detection sensor (4) are sent to CPU. In CPU (11), from respiration signals, a breathing rate is counted, and it converts into the breathing rate per minute after measuring finish, and let this be a measurement result.

[0027]The pattern of pulse wave measured simultaneously with SaO_2 and pulse rate data as

prevention from a misdiagnosis of the medical practitioner by a patient's failure by the measurement using the oximeter in blood will be sent to the medical practitioner side. As shown in drawing 3, when there is a problem in measurement -- measurement moves violently a finger with shallow (drawing 3 .b) insertion of a finger compared with a right case (drawing 3 .a) (drawing 3 .c) -- SaO_2 is low about 10%. If a pattern of pulse wave (figure a.b.c) is seen at this time, the medical practitioner side can judge ***** as a result of obtaining SaO_2 data by right measurement, and can perform prevention from a misdiagnosis.

[0028]A pattern of pulse wave as shown in the SaO_2 data processed by CPU (11), pulse rate data, and drawing 3 (a), and breathing-rate data are displayed on a liquid crystal graphical display machine (17).

[0029]Thus, the practically outstanding advantage to which judgment of being fitness physiology information becomes easy, and the prevention from a misdiagnosis is attained in the case of diagnosis by the hospital side is acquired by being characterized by this invention transmitting the pattern-of-pulse-wave data by which parenchyma top coincidence measurement was carried out with the saturation of oxygen in blood, etc.

[0030]Next, the report to a medical practitioner is explained.

[0031]** An immediate report document corresponds, when a patient wants to send a measurement result to a medical practitioner's hand immediately. Shortly after the computer of an information gathering center receives this measurement result, after recording on memory storage, via a facsimile, it changes this measurement result into an immediate report document, and transmits to a medical practitioner. At this time, the medical practitioner can carry out more suitable diagnosis and treatment by part[on several]-giving the last measurement result, and drawing up a report.

[0032]** A periodical report collects the measurement result from a patient by fixed time, summarizes it in a report, and transmits to a medical practitioner's office hours belt (usually during the morning of the next morning) to a medical practitioner. Although separately decided on a period according to a patient's condition, it is a day cycle and the stable patient is usually good also as three to 7 diurnal periodicity.

[0033]** A moon degree report is a report which contained the trend graph of blood oxygen levels, etc. by the contents which collected the measurement result from a patient by one month so that could grasp the change with time for one month.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]Illustration of the desirable concrete mode about the composition of the whole home therapy supporting system of this invention.

[Drawing 2]Illustration of the desirable concrete mode of the home communication apparatus installed in being home in the home therapy supporting system of this invention.

[Drawing 3] Illustration of the pattern-of-pulse-wave data measured by the detection probe with which the finger was equipped.

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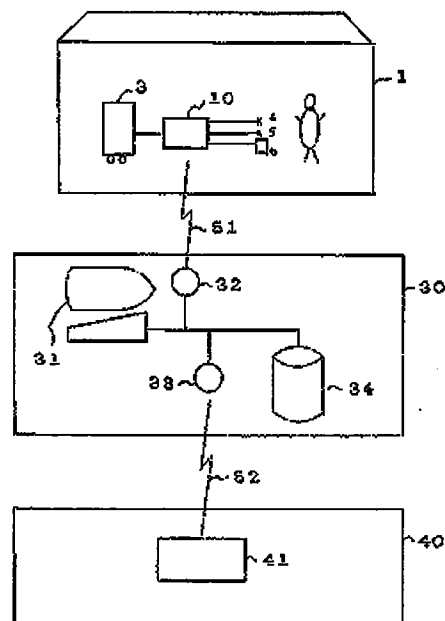
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(54) 【発明の名称】 在宅療法支援システム

(57) 【要約】

【目的】 在宅患者の治療において、患者の状態を医師が正確に把握することを容易にした低コストの在宅療法支援システムを提供することを目的としている。

【構成】 ①各患者宅に配置されて在宅患者の生理情報に関する医療情報の信号を送信するための送信手段を具備した在宅通信装置と、②該情報収集センターに配置されて受信手段と、受信された信号を診断に適した図表及び文字情報に変換するための信号変換手段と、図表及び文字情報を病院に伝送するためのファクシミリ手段とを具備した医療情報収集装置と、③病院に配置された図表及び文字情報の受信装置と、④該在宅通信装置と該医療情報収集装置と該図表及び文字情報の受信装置とを結ぶ公衆電話回線とからなる在宅療法支援システムであって、生理情報が同時測定された血中酸素飽和度及び脈拍数と脈波波形データを含むものである在宅療法支援システムを提供する。



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【特許請求の範囲】

【請求項1】 ①各患者宅に配置されて在宅患者の生理情報に関する医療情報の信号を情報収集センターに送信するための送信手段を具備した在宅通信装置と、②該情報収集センターに配置されて、該在宅通信装置から送信されてきた医療情報に関する信号を受信するための受信手段と、受信された信号を診断に適した図表及び文字情報に変換するための信号変換手段と、該信号変換手段により変換された図表及び文字情報を病院に伝送するためのファクシミリ手段とを具備した医療情報収集装置と、③病院に配置されて、該医療情報収集装置から伝送されてきた図表及び文字情報を受信するためのファクシミリ手段を具備した診断に適した図表及び文字情報の受信装置と、④該在宅通信装置と該医療情報収集装置と該図表及び文字情報の受信装置とを結ぶ公衆電話回線とからなる在宅療法支援システムであって、該生理情報が、具備される測定手段により同時測定された血中酸素飽和度及び／又は脈拍数の数値データと脈波信号の波形データを含むものである在宅療法支援システム。

【請求項2】 該脈拍数の数値データが、測定の後半部における平均値と標準偏差からなるものである請求項1の在宅療法支援システム。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、在宅酸素療法を実施する患者の如く、長期に亘って在宅で治療を実施する必要のある各種疾患の医療情報及び医療機器に関する在宅療法支援システムである。

【0002】

【従来の技術】 長期の治療を必要とする呼吸疾患や高血圧、糖尿病等の慢性疾患の患者は、医師の処方に基づいて治療を続けながら、定期的に、或いは、その時どきの症状に応じて通院を行うことで健康状態を管理している。この場合において患者の健康状態やコンプライアンスを医師が正確に把握し、適切な指導を行うには、かなりの問題がある。

【0003】 例えば、在宅酸素療法の患者の場合、通院で体力を消耗し定期診断時には平素より低めの血中酸素飽和度を呈したりする。山間部や離島に居住する患者にあっては、通院することの体力的負担自体が問題である。また、患者が酸素濃縮器から生成される高濃度の酸素を処方通り吸引しているかどうか、コンプライアンスの把握も医師の診断上重要である。

【0004】 このような問題に対し、コンピュータ通信を利用して、患者の健康状態や医療機器の使用状況を管理するシステムが各種提案されている。

【0005】 公報に開示された例として、特開平4-15035号公報（在宅療養支援システム）、特開平2-246463号公報（検査情報伝送システム）、特開昭63-252137号公報（医学診断用電子装置）及び

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特開昭63-79643号公報（人体健康モニタ）などがある。

【0006】

【発明が解決しようとする課題】 しかしながら、これら従来のシステムでは、実用化する場合に装置コストが非常に高くなるとか、システム導入後の運用が難しい等の問題がある。

【0007】 即ち、在宅患者の生理に関する生体情報は、患者宅に設置された装置から、病院に設置された情報収集センターのコンピュータに直接伝送されるシステム構成が一般的であるが、この場合、病院側は個々に、コンピュータを保有しなければならない。しかし、大部分の病院が抱えている患者数は、10～100名以下であるため、専用のコンピュータを導入することは躊躇されることが多い。

【0008】 また、病院側には市販のファクシミリを設置するシステムの場合、患者宅に設置する装置には、画像変換機能とファクシミリ伝送機能をもたせることが必要になりコスト的に有利とはならない。更に、経時的な診断を行うため、患者の生体情報を長期間記録するメモリー機能を必要とする場合には、やはり、コンピュータを病院側に設置せざるを得ない。

【0009】 一方、在宅で治療を続ける患者は、日々の体調の他、必要に応じて、体温計や簡易心電計、血中酸素飽和度計等を用いて測定を行い結果を療養日誌に書き留める。これを、通院時に医師に提示して診断してもらうことになるが、現実には次のような多くの問題がある。即ち、患者が毎日療養日誌を正確に書き続けること、前記の測定器を正しく操作することとその結果の保管、通院の頻度、容体の急変時の対応などである。

【0010】 この問題に対して、特開平4-56561号公報、特開平4-15035号公報などのシステム提案が開示されているが、何れも、病院側の情報センターにコンピュータを設置することが必要であり全体のシステムコストは高くなる。

【0011】 本発明者等は、上記従来の課題に鑑み特願平5-21085で、各種疾患の在宅治療において、患者の通院回数の減少や療養日誌記入、体調測定の負担軽減、容体急変時の緊急対応を図ると共に、従来より低コストの在宅療法支援システムを提案した。

【0012】 かかる在宅療法支援システムにあっては血中酸素飽和濃度計（例えば検出プローブ内に入差し指を挿入し、光の吸収現象を利用して飽和濃度を測定するパルスオキシメーター（商標名））を患者自身が操作することになる。この操作について医師側から患者に適正な指導がなされはするものの、素人であるが故に次に述べるような操作ミスによって誤ったデータが医師側に伝わることもある。操作ミスの例としては①指の挿入が浅い、②挿入している指を動かす等が挙げられ、血中酸素飽和濃度が数%低めに測定されてしまう。このような誤

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りのデータが医師側に送られてきた場合、医師側は誤った診断を下す危険性もある。

【0013】

【発明の目的】本発明はかかる問題を鑑みなされたものであり、その目的は誤診を防止できる在宅療法支援システムを提供することにある。

【0014】

【課題を解決するための手段】本発明は、①各患者宅に配置されて在宅患者の生理情報に関する医療情報の信号を情報収集センターに送信するための送信手段を具備した在宅通信装置と、②該情報収集センターに配置されて、該在宅通信装置から送信されてきた医療情報に関する信号を受信するための受信手段と、受信された信号を診断に適した図表及び文字情報に変換するための信号変換手段と、該信号変換手段により変換された図表及び文字情報を病院に伝送するためのファクシミリ手段とを具備した医療情報収集装置と、③病院に配置されて、該医療情報収集装置から伝送されてきた図表及び文字情報を受信するためのファクシミリ手段を具備した診断に適した図表及び文字情報の受信装置と、④該在宅通信装置と該医療情報収集装置と該図表及び文字情報の受信装置とを結ぶ公衆電話回線とからなる在宅療法支援システムであって、該生理情報が、具備される測定手段により同時測定された血中酸素飽和度及び／又は脈拍数の数値データと脈波信号の波形データを含む在宅療法支援システムを提供するものである。

【0015】かかる在宅療法支援システムによって、一つの血中酸素飽和度計から得られる3つのデータを医師は総合的に観ることにより、誤飽和度計の操作ミスの有無を鑑別できる。

【0016】

【作用】本発明では、患者宅からの医療データは、情報収集センターを経由して、担当の医師のもとへファクシミリで届けられる。データの統計的処理や画像変換、データベース管理等高度な処理はセンターのコンピュータが行うため、患者宅に設置する通信装置はその機能を簡単に行うことができる。また、電話回線でデータを送るモデムの近年普及したパソコン通信と同程度の低価格なものを使用できる。一方、病院には特別な受信装置を設置する必要はなく、市販のファクシミリが使用できるため、システム全体のコストを従来より低価格にするだけでなく、数名の在宅患者を治療する病院でも、本発明による在宅療法支援システムを実施することが可能となった。更に、血中酸素飽和度、脈拍数の数値データは、過去のデータといっしょにトレンドとして診断上有無なものとなる。この際新しいデータが過去のデータと比べ低くなった場合、脈波の波形データを良く観察することにより、操作上のミスによるものか、患者の容態変化によるものか医師側で判断できるようになった。

【0017】

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【実施例】図1及び図2に本発明の実施例を示す。図1は、全体の構成を示すものであり、図2は、在宅に設置される通信装置(10)の詳細を示したものである。

【0018】図1において、(1)は患者が居住する家庭であり、患者は、酸素濃縮器(3)より高濃度の酸素を吸引しながら在宅酸素療法を実施する。

【0019】詳細は後述するが、患者宅に設置される通信装置(10)には、酸素濃縮器の運転情報の他、患者の問診情報、呼吸数、血中酸素飽和度、脈拍、心電波形等の医療情報が取り込まれる。これらの情報は、モデム(12)により、公衆電話回線(51)を介して、医療情報収集装置である情報収集センター(30)に設置されたコンピュータ(31)へ送信される。該コンピュータ(30)にはモデム(32)が接続されており、これにより各家庭との医療情報通信を行うことができる。各家庭から送信されてきた医療情報は大容量の記憶装置(34)に記録・管理される。尚、図1中、(4)は患者の呼吸数を検出するセンサー手段を表わし、(5)は患者の血中酸素飽和度を測定するための検出プローブ手段であり、(6)は簡易心電計を表わす。

【0020】ここで、記憶された各患者の医療情報は、目的用途に応じて、概略、例えば次の3種類の報告書が作成される。即ち、①緊急報告書、②定期報告書、③月度報告書である。家庭から送られてくる情報の形態は、文字列であるか、或いは、心電波形等を量子化した数値列であるため、これらの情報は、前記の報告書様式に画像変換されてコンピュータに接続されたファクシミリ(33)から公衆電話回線(52)を介して、患者が通院する病院(40)に設置されたファクシミリ(41)へ送信され、担当医師の手元へ届けられる。

【0021】次に図2により通信装置(10)を説明する。通信装置は、CPU(11)と情報センターのコンピュータと公衆電話回線を介してデータ通信を行うモデム(12)と、酸素濃縮器(3)からの装置運転情報を受信する通信インターフェイス(13)と、患者の呼吸数を検出するセンサー(4)を接続するインターフェイス(14)と、患者の指に装着する検出プローブ(5)を接続して血中酸素飽和度と脈拍数を測定する測定部(15)と、簡易心電計(6)で測定された心電波形データを光伝送で受信するインターフェイス(16)と、患者との対話を行うための液晶グラフィック表示器(17)及びタッチパネル(18)と時刻管理を行うためのカレンダー機能部(19)と、ブザー等の音響発生部(20)と医療データ測定開始のための押し紐(21)から構成される。

【0022】通信装置は、カレンダー機能により定時刻になると音響発生部より、測定の時刻になったことを患者へ知らせ、体調に関する問診データの入力や測定器を用いた体調測定を実施するよう督促をする。患者は、液晶表示器に表示された食欲や体温等に関する質問と準備

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された回答項目の中からタッチパネルを操作しながら問診結果を入力する。その後、続けて液晶表示画面の指示に従って、呼吸数や血中酸素飽和度、脈拍数、心電図の測定を実施する。最後に、測定結果を医師の手に緊急で届けるか否かを入力することで一回の医療データ測定が終了する。

【0023】一方、酸素濃度器からの通信情報が、常時、通信装置に取り込まれており、患者のコンプライアンスを確認するのに有効な設定流量毎の使用時間情報が生成されるようにしてもよい。また、患者が定時刻に不都合な場合は、押し加（21）により臨時に、前記と同じ医療データ測定を実施できる。測定器を用いた心電図等の測定や、問診等全ての項目を一日に数回実施することは患者の負担を非常に大きくすることになるため、患者の都合に合わせて必要な項目を必要な頻度で実施するような測定手順がプログラム上配慮されている。

【0024】ここで血中酸素飽和度、脈拍数及び呼吸数の測定について説明する。測定部（15）から血中酸素飽和度（以下 SaO_2 と称する）データ及び脈拍数データは夫々97%、70回の如く数値データとして1.0秒のサンプル周期でCPU（11）に送られる。また同時に、測定部（15）から図3（a）に示す如く脈波波形データが出力されており、該波形データは0.01秒のサンプル周期でCPU（11）に送られる。CPU（11）では、測定時間（45秒）の間データを受けとり、測定後半の20秒分のデータを有効データとし、以下のように扱うことが好ましい。

【0025】 SaO_2 、及び脈拍数データは、有効データに対して平均と標準偏差を求め、これを測定結果とする。脈波高値は、後半20秒の有効データを波形データとする。

【0026】呼吸数データは、 SaO_2 、及び脈拍数の測定と同時に測定を行うことが望ましい。呼吸数検出センサー（4）の安定の為、呼吸数の測定は、 SaO_2 測定開始より25秒後に開始する。測定は20秒間行い、呼吸数検出センサー（4）より検出された呼吸信号をCPUに送る。CPU（11）では、呼吸信号より呼吸数を数え、測定終了後、1分間あたりの呼吸数に換算し、これを測定結果とする。

【0027】血中酸素飽和度計を使った測定で、患者の操作ミスによる医師の誤診防止としては、 SaO_2 、及び脈拍数データと同時に測定した脈波波形を、医師側に送ることとする。図3に示すように、測定が正しい場合（図3. a）と比べて、指の挿入が浅い（図3. b）、指を強く動かす（図3. c）など測定に問題があるとき、 SaO_2 は10%程低くなっている。このとき、脈波波形（図a. b. c）を見れば、医師側は SaO_2 データが正しい測定で得られた結果かどうか判断でき、誤診防止ができる。

【0028】液晶グラフィック表示器（17）には、CPU（11）で処理した SaO_2 データ、脈拍数データ及び図3（a）に示されるような脈波波形、並びに呼吸数データが表示される。

【0029】この様に本発明は、血中酸素飽和度等と共に実質上同時測定された脈波波形データを送信するようにしたことを特徴とするものであって、病院側での診断の際に適性な生理情報か否かの判断が容易になり、誤診防止が可能になる実用上優れた利点が得られる。

【0030】次に、医師への報告書について説明を行う。

【0031】①の緊急報告書は、患者が測定結果を緊急に医師の手に届けたい場合に対応するものである。情報収集センターのコンピュータは、この測定結果を受け取ると、記憶装置に記録した後、直ちに、ファクシミリを介して医師へこの測定結果を緊急報告書に変換して送信する。この時、直前の測定結果を数日分付与して報告書を作成することにより、医師はより適切な診断と処置が実施できる。

【0032】②の定期報告書は、患者からの測定結果を一定期間分集約して報告書にまとめ、医師の勤務時間帯（通常、翌朝の午前中）に医師へ送信する。朝間は患者の症状に応じて個々に取り決めるが、通常、一日周期であり、安定した患者は3～7日周期としてもよい。

【0033】③の月度報告書は、患者からの測定結果を一ヶ月分集約した内容で、一ヶ月分の経時的変化が把握できるような、例えば、血中酸素濃度のトレンドグラフ等を含んだ報告書である。

【0034】

【発明の効果】以上説明したように、本発明によれば、患者は、従来病院でしか出来なかった問診や測定器を用いた体調測定を自宅で実施できる。このことは、通院による体力消耗を少なくし、しかも、平素の状態での測定データを医師が知ることができる。血中酸素濃度が低下した場合、脈波波形を参照して患者の測定状況を把握することができると共に、測定データの信頼性のチェックも行うことができる。このように、本システムは、患者がより安心して在宅療法を実施できるので、高齢化が進み、在宅療法を実施する患者が今後益々増加する今日、必要不可欠なシステムと言える。

【図面の簡単な説明】

【図1】本発明の在宅療法支援システムの全体の構成についての好ましい具体的態様の例示。

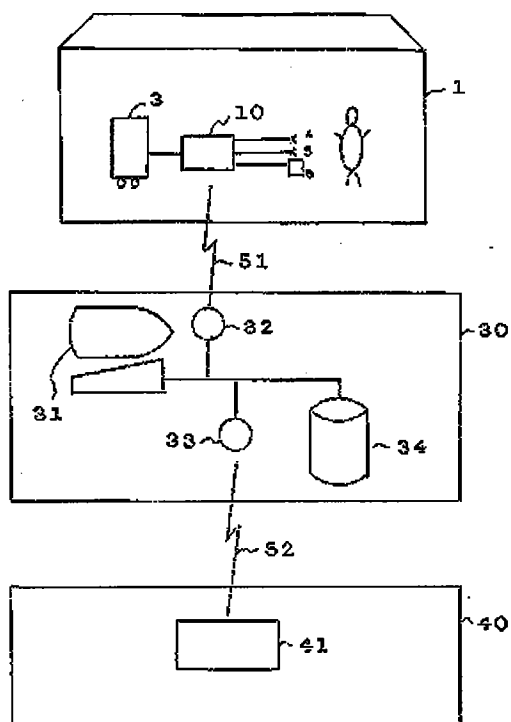
【図2】本発明の在宅療法支援システムにおいて、在宅に設置される在宅通信装置の好ましい具体的態様の例示。

【図3】指に装着された検出プローブにより測定された脈波波形データの例示。

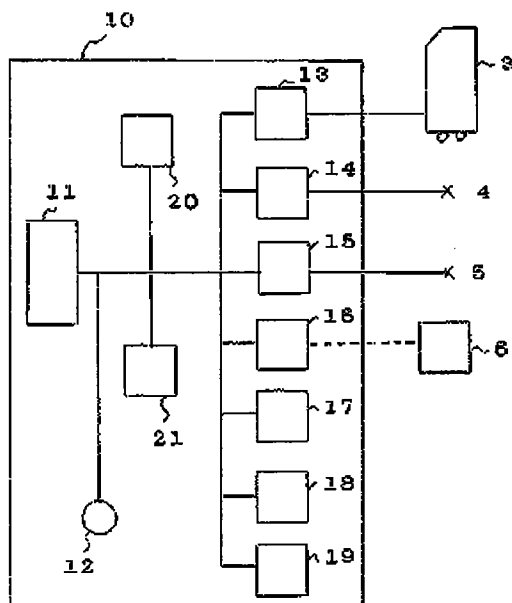
(5)

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【図1】



【図2】

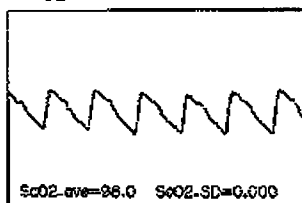


(6)

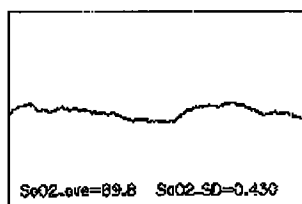
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【図3】

(a) 正しい場合



(b) 揺の差入が強い



(c) 揺が動いた場合

